



# FROEHLING & ROBERTSON, INC.

*Engineering Stability Since 1881*

310 Hubert Street  
Raleigh, North Carolina 27603-2302  
T 919.828.3441 | F 919.828.5751  
NC License #F-0266

October 17, 2017 (revised February 5, 2018)

**North Carolina Department of Transportation**  
**Geotechnical Engineering Unit**  
1020 Birch Ridge Drive  
Raleigh, North Carolina 27610

Attn.: Mr. Gordon Box, L.G.  
GeoEnvironmental Project Manager

**Re:** State Project: R-2530B  
WBS Element: 34446.1.6  
NC 24-27 from Bird Road in Albemarle to West of the Pee Dee River

**Subject: Preliminary Site Assessment**  
**Parcel #140 – Divya LLC (Gran Prix/Tillery Sportsman BP Active Gas Station)**  
48130 Hwy 24/27 East  
Albemarle, North Carolina  
F&R Project #66V-0092

Dear Mr. Box:

Froehling and Robertson, Inc. (F&R) has completed the authorized Preliminary Site Assessment at Edward D. Roberson property located in Albemarle, North Carolina. The work was performed in general accordance with F&R's Proposal No. 1866-00132, dated June 14, 2017 (and revised June 22, 2017). Notice to Proceed was issued to F&R on July 6, 2017. This report documents our field activities, presents the results of laboratory analysis and provides estimated quantities of petroleum impacted soils.

Please do not hesitate to contact us if you should have any questions regarding this report.

Sincerely,

**FROEHLING & ROBERTSON, INC.**

Clint E. Sorrell  
Environmental Scientist

Benjamin A. Whitley, P.E.  
GeoEnvironmental Services Manager





## **PRELIMINARY SITE ASSESSMENT**

**Divya LLC (Parcel #140)  
Gran Prix/Tillery Sportsman BP Active Gas Station  
48130 Hwy 24/27 East  
Albemarle, North Carolina  
State Project: R-2530B  
WBS Element: 34446.1.6  
F&R Project #66V-0092**

**October 17, 2017 (revised February 5, 2018)**

### **Prepared for:**

**North Carolina Department of Transportation  
Geotechnical Engineering Unit  
1020 Birch Ridge Drive  
Raleigh, NC 27610**



## TABLE OF CONTENTS

	<u>PAGE</u>
1.0 INTRODUCTION .....	1
2.0 GEOPHYSICAL SURVEY.....	2
3.0 SITE ASSESSMENT ACTIVITIES .....	2
4.0 SUBSURFACE CONDITIONS .....	3
5.0 ANALYTICAL RESULTS .....	4
6.0 CONCLUSIONS AND RECOMMENDATIONS.....	4
7.0 LIMITATIONS.....	5
APPENDIX I	FIGURE No. 1 – Topographic Map
	FIGURE No. 2 – Site Vicinity Map
	FIGURE No. 3 – Laboratory Results & Boring Location Plan
APPENDIX II	GEOPHYSICAL REPORT PREPARED BY PYRAMID
APPENDIX III	SITE PHOTOS
APPENDIX IV	GEOPROBE LOGS
APPENDIX V	LABORATORY ANALYTICAL RESULTS



**Preliminary Site Assessment Report  
Divya LLC Property (Parcel #140)  
Albemarle, Stanly County, North Carolina  
F&R Project No. 66V-0092**

## **1.0 Introduction**

Froehling and Robertson, Inc. (F&R) has prepared this Preliminary Site Assessment (PSA) Report to document soil assessment activities performed at the Divya LLC Property addressed as 48130 Highway 24/27 East, in Albemarle, Stanly County, North Carolina. The site is located on the southwest quadrant of the NC 24/27 and Indian Mount Road Extension intersection as shown in Appendix I, Figures 1 and 2. As indicated in the Request for Technical and Cost Proposal (RFTCP), the site operates as an existing gas station and convenience store (Tillery Sportsman Store). According to the NCDEQ UST Section Registry, the site has been assigned Facility ID # 0-008319 associated with three USTs that were installed in 1976. In addition, the site has been assigned Incident # 6376. The incident was reported in 1990 and closed out in 2007. A UST bed is located on the northwest corner of the property, approximately 35 feet from the edge of the pavement of NC 24/27.

According to the NCDOT within their RFTCP, acquisition of right-of-way is necessary for the proposed NC 24-27 design. As such, the NCDOT requested a PSA be performed to assess the possibility of encountering petroleum impacted soil from known or unknown USTs, and to locate USTs which may exist within proposed easements and right-of-way at the project site.

The PSA was performed in general accordance with F&R's Proposal No. 1866-00132, dated June 14, 2017 (and revised June 22, 2017) with Notice to Proceed issued to F&R by the NCDOT on July 6, 2017. The purpose of this report is to document field activities, present the results of laboratory analysis, and provide estimated quantities of petroleum impacted soils.

The existing on-site structure is one-story in height and is presumably constructed of brick and vinyl siding. The remainder of the site consists of an asphalt paved parking lot and cleared/wooded land. The site is bordered to the north by NC 24/27; to the south by cleared/wooded land and scattered residential development; to the east by Indian Mound Road Extension; and to the west by cleared land and scattered residential development. Access to the site is gained from NC 24/27 to the north and Indian Mound Road Extension to the east.



## **2.0 Geophysical Survey**

Prior to F&R's soil assessment activities, Pyramid Environmental & Engineering, P.C. (Pyramid) conducted a geophysical survey to locate suspect metal underground storage tanks (USTs). The geophysical work was conducted on July 24, 2017 and was performed within the proposed right-of-way of NC 24-27.

The geophysical investigation consisted of electromagnetic (EM) induction surveys using a Geonics EM61 instrument. Ground-penetrating radar (GPR) investigations of selected EM61 anomalies were investigated using a Geophysical Survey Systems UtilityScan DF unit equipped with a dual frequency 300/800 MHz antenna. The GPR was performed to verify the presence of metal reinforcement in concrete adjacent to the building. The EM61 data was collected along parallel survey lines spaced approximately 5 feet apart. The data was reviewed in the field to evaluate the possible presence of USTs and later transferred to a desktop computer for further review. Isolated EM anomalies were identified on the site, including signs, and reinforced concrete. In addition, three known, active USTs were located on the northwestern portion of the asphalt paved parking lot.

Based on the EM data collected at the site, Pyramid did not observe anomalies that were interpreted to be the results of unknown metallic USTs within about 8 feet of the ground surface. However, three known, active USTs are present on the northwestern portion of the asphalt paved parking lot. The complete geophysical report is attached as Appendix II.

## **3.0 Site Assessment Activities**

F&R visited the site on August 29, 2017 to perform the Preliminary Site Assessment. The assessment consisted of advancing 6 borings into the soils at the project site using direct-push technology (GeoProbe). The boring locations were determined by F&R staff based on the results of the geophysical survey, site features and proposed construction activities. Four of the borings (B-1 through B-4) were advanced on the northwestern portion of the site, adjacent to the active UST basin. Borings B-5 and B-6 were advanced on the north-northeastern portion of the site, adjacent to NC 24/27. F&R attempted to advance the borings adjacent to the UST basin (B-1 through B-4) to the proposed depth of 12 feet below ground surface (bgs) and the borings adjacent to NC 24/27 (B-5 and B-6) to the proposed depth of 10 feet bgs. However, Borings B-1 through B-4 were terminated at depths ranging from 10 feet bgs (B-1 and B-4) to 11 feet bgs (B-2 and B-3) and Boring B-6 was terminated at a depth of 7.5 feet bgs, where GeoProbe refusal was



encountered. Photos detailing existing site features are attached as Appendix III and boring locations are depicted in Figure 3 of this report.

Soil sample cores from the borings were collected in disposable, 4-foot long acetate sleeves. The soil samples were visually/manually classified and screened in the field using a calibrated photo-ionization detector (PID) for evidence of petroleum hydrocarbons. Evaluation of VOC concentrations were performed using a MiniRae 3000 PID which produces results in parts per million (ppm). A representative soil sample was collected from two foot sections of each sleeve and placed in a re-sealable plastic bag. The vapors were then allowed to equilibrate in the headspace of the bag for approximately ten minutes prior to measurement with the PID. The measurements were collected by placing the probe tip into the headspace of the bag. PID measurements can be found in the GeoProbe Logs in Appendix IV, as well as in Table 1 in Section 5.0 below.

Generally, the soil sample in each boring which exhibited the highest PID concentration was submitted for laboratory analysis for diesel range organics (DRO), gasoline range organics (GRO), Total BTEX (benzene, toluene, ethylbenzene and xylenes), 16 PAHs (polycyclic aromatic hydrocarbons) and BaP (Benzo(a)pyrene) by Ultraviolet Fluorescence (UVF) technology (RedLab QED Hydrocarbon Analyzer).

The samples were collected in laboratory-supplied sample containers, placed in a cooler with ice, and shipped via UPS to RedLab in Wilmington, North Carolina following standard chain-of custody procedures.

#### **4.0 Subsurface Conditions**

As indicated in the attached GeoProbe Logs (Appendix IV), subsurface conditions from existing ground surface to boring termination primarily included various layers of dry-moist, white-gray-orange-brown-tan silty sandy clay. F&R attempted to advance the borings adjacent to the UST basin (B-1 through B-4) to the proposed depth of 12 feet below ground surface (bgs) and the borings adjacent to NC 24/27 (B-5 and B-6) to the proposed depth of 10 feet bgs. However, Borings B-1 through B-4 were terminated at a depths ranging from 10 feet bgs (B-1 and B-4) to 11 feet bgs (B-2 and B-3) and Boring B-6 was terminated at a depth of 7.5 feet bgs, where GeoProbe refusal was encountered due to dense clay.

PID readings generally ranged from 0.3 to 7.0 ppm. However, elevated VOC readings and weathered petroleum odors were encountered in Boring B-1 from 6 to 10 feet bgs. Petroleum



odors were not observed in other borings and groundwater was not observed during field screening or sample collection activities.

## 5.0 Analytical Results

As shown in the following table, petroleum hydrocarbons identified as GRO were not encountered in the soil samples obtained from the project site. Petroleum hydrocarbons identified as DRO were encountered in the soil samples at four boring locations advanced at the site (B-2 through B-5), at depths from 0 to 2 feet bgs (B-4) to 8 to 10/10.5 feet bgs (B-2 and B-5). The laboratory results indicate that the DRO concentrations ranged from 0.22 mg/kg (B-4) to 51.7 mg/kg (B-3), which are below the NCDEQ Action Level of 100 mg/kg.

The laboratory analytical results indicate concentrations of the sum of 16 EPA PAHs above the method detection limit, but below the total NCDEQ Action Level of 9,068.816 mg/kg at Boring B-3. The soil analytical results are summarized in Table 1 below. The laboratory analytical results can also be found in the attached Appendix V of this report.

**Table 1**  
**Soil Sampling Analytical Results**

Sample ID	Sample Date	Sample Depth (ft bgs)	PID Reading (ppm)	GRO (mg/kg)	DRO (mg/kg)	TPH (mg/kg)	Total BTEX (mg/kg)	Total Aromatics (mg/kg)	16 EPA PAHs (mg/kg)	BaP (mg/kg)
B-1	8/29/17	8-10	57.4	<0.58	<0.58	<0.58	<0.58	<0.12	<0.18	<0.023
B-2		8-10	7.0	<0.56	1.9	1.9	<0.56	1.4	<0.18	<0.022
B-3		4-6	4.5	<0.54	51.7	51.7	<0.54	26	1.4	<0.021
B-4		8-10	0.3	<0.22	0.22	0.22	<0.22	0.12	<0.07	<0.009
B-5		0-2	3.3	<0.28	2	2	<0.28	1.6	<0.09	<0.011
B-6		2-4	0.5	<0.29	<0.29	<0.29	<0.29	<0.06	<0.09	<0.012
NCDEQ Action Level				50	100	NSE	13.8056	NSE	9,068.816	0.088

Concentrations shown in bold exceed the NCDEQ Action Level as outlined in the NCDEQ, DWM, UST Section Guidelines

ppm = parts per million

GRO = Gasoline Range Organics

DRO = Diesel Range Organics

TPH = Total Petroleum Hydrocarbons

BTEX = Benzene, Toluene, Ethylbenzene and Xylenes

NSE = No Standard Exists

## 6.0 Conclusions and Recommendations

F&R conducted a PSA at the Divya LLC Property addressed as 48130 Highway 24/27 East, in Albemarle, Stanly County, North Carolina. A geophysical investigation was performed by Pyramid



Environmental & Engineering to investigate the presence and location of USTs in the proposed right-of-way. Based on the results of the geophysical survey, it was determined that unknown USTs were not present within the surveyed area. However, a known UST basin is present on the northwestern portion of the asphalt paved parking lot.

Six GeoProbe borings were advanced during the assessment within the proposed right-of-way, where grading activities are proposed in association with the NC 24-27 improvements. Based on the results of laboratory testing and observed PID readings, petroleum impacted soils were encountered in the vicinity of boring locations B-2 through B-5. Laboratory analysis detected concentrations of DRO at these locations; however, the concentrations of these compounds were below the NCDEQ Action Level of 100 mg/kg.

It should be noted that a delineation of the soil contamination was not performed, as this was not included in the proposed scope of work. The above conclusions are based on interpretations of soil analytical results, PID readings and our experience with petroleum UST releases

## **7.0 Limitations**

These services have been performed, under authorization of the North Carolina Department of Transportation for specific application on this project. These services have been performed in accordance with generally accepted environmental and hydrogeological practices. No other warranty, expressed or implied is made. As with any subsurface investigation, actual conditions exist only at the precise locations from which samples were taken. Certain inferences are based on the results of sampling and related testing to form a professional opinion of conditions in areas beyond those from which samples were taken. Our conclusions and recommendations are based upon information provided to us by others, our sampling and testing results and our site observations. We have not verified the completeness or accuracy of the information provided by others, unless otherwise noted. Our observations are based upon conditions readily visible at the site at the time of our site visits.

Froehling & Robertson, Inc. by virtue of providing the services described in this report, does not assume the responsibility of the person(s) in charge of the site, or otherwise undertake responsibility for reporting to any local, state or federal public agencies any conditions at the site that may present a potential danger to public health, safety or the environment. In areas that require notification of local, state, or federal public agencies as required by law, it is the Client's responsibility to so notify.





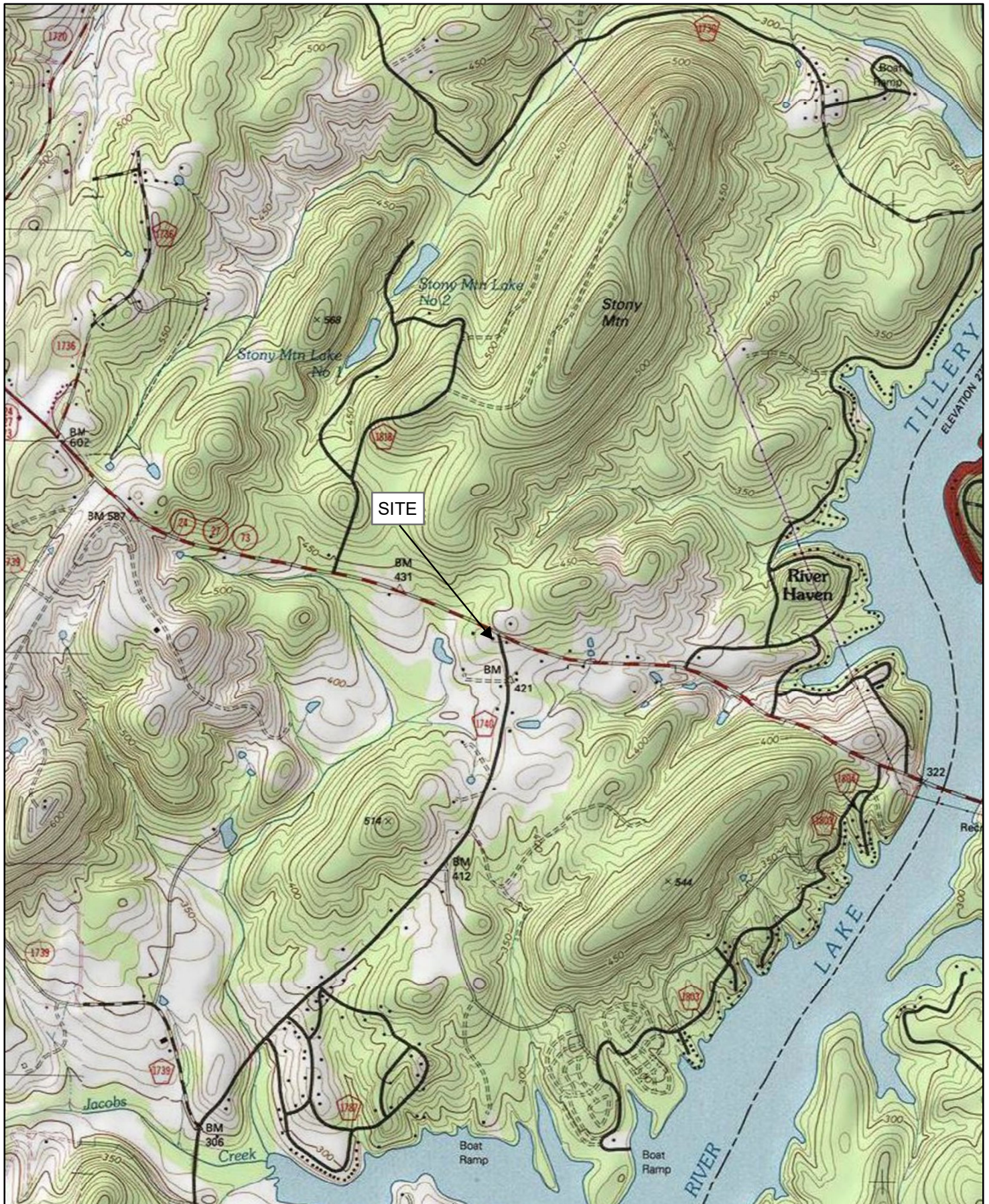
## **APPENDIX I**

**Figure No. 1 – TOPOGRAPHIC MAP**

**Figure No. 2 – SITE VICINITY MAP**

**Figure No. 3 – LABORATORY RESULTS & BORING LOCATION PLAN**





# SITE TOPOGRAPHIC MAP

0 1,000 2,000 4,000 6,000 Feet



**FROEHLING & ROBERTSON, INC.**

Engineering Stability Since 1881

310 Hubert Street

Raleigh, North Carolina 27603-2302 | USA

T 919.828.3441 | F 919.828.5751

Client: NCDOT

Project: R-2530B PSAs

Location: Parcel #140, Albemarle, NC

F&R Project No.: 66V-0092

48130 Highway 24-27 East - Albemarle, North Carolina

Data: USGS 2013

Date: October 2017 (Revised Feb. 5, 2018)

Scale: 1:24,000 1 inch = 2,000 feet

Disclaimer: F&R makes no warranties or guarantees regarding the accuracy or completeness of geographic features shown on this map. Spatial accuracy of measurement provided by source agencies can be obtained by contacting F&R.

FIGURE  
No.: 1





## SITE VICINITY MAP

0 100 200 400 600 Feet



**FROEHLING & ROBERTSON, INC.**  
Engineering Stability Since 1881  
310 Hubert Street  
Raleigh, North Carolina 27603-2302 | USA  
T 919.828.3441 | F 919.828.5751

Client:	NCDOT	Disclaimer: F&R makes no warranties or guarantees regarding the accuracy or completeness of geographic features shown on this map. Spatial accuracy of measurement provided by source agencies can be obtained by contacting F&R.
Project:	R-2530B PSAs	
Location:	Parcel #140, Albemarle, NC	
F&R Project No.:	66V-0092	48130 Highway 24-27 East - Albemarle, North Carolina
Data:	ArcMap Imagery	
Date:	October 2017 (Revised Feb. 5, 2018)	Scale: 1:2,400 1 inch = 200 feet

FIGURE  
No.: 2



B-4: 8.0'-10.0'  
GRO=<0.22 mg/kg  
DRO=0.22 mg/kg  
TOTAL BTEX=<0.22 mg/kg  
TOTAL AROMATICS=0.12 mg/kg  
16 EPA PAHs=<0.07 mg/kg  
BaP=<0.009 mg/kg

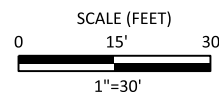
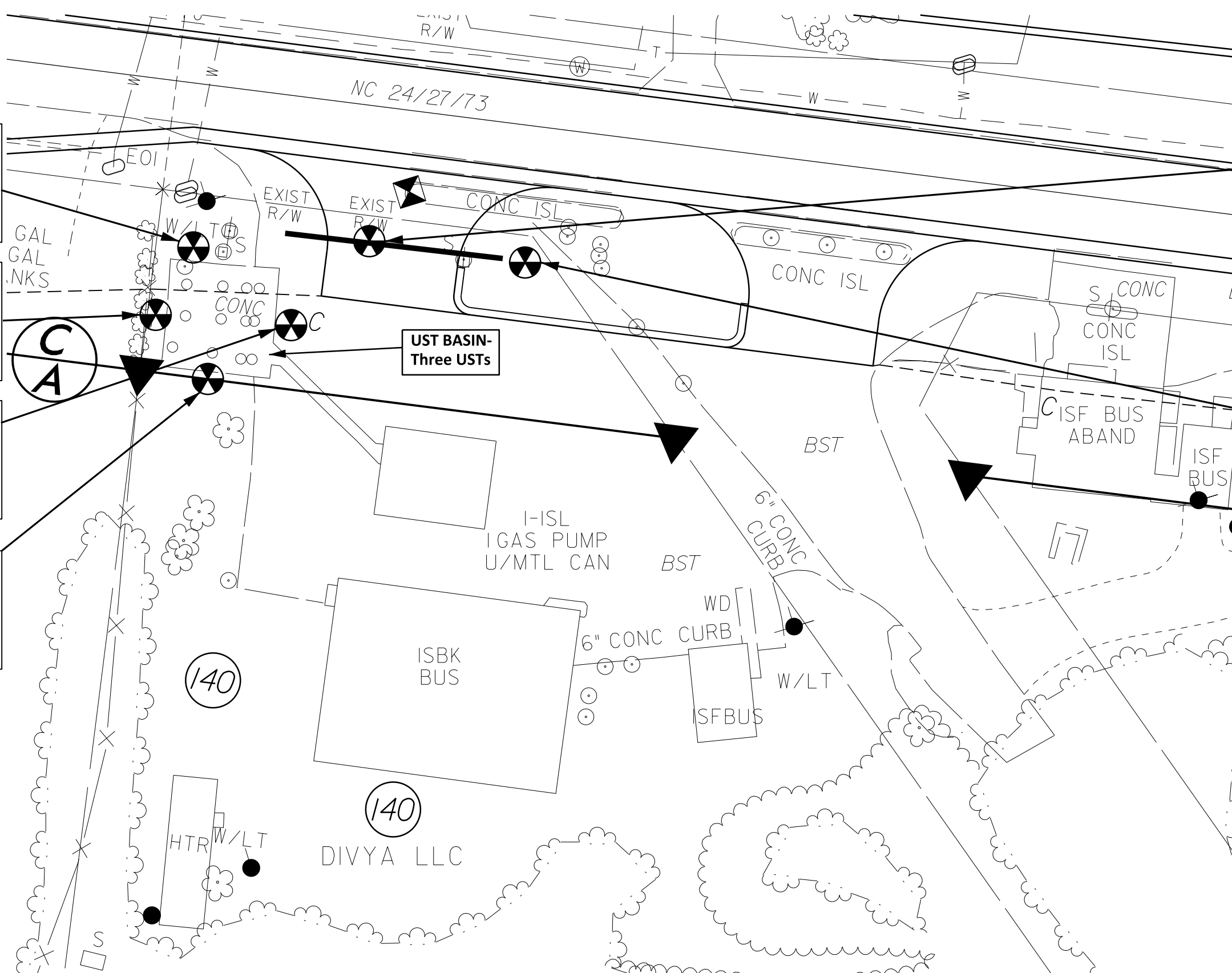
B-1: 8.0'-10.0'  
GRO=<0.58 mg/kg  
DRO=<0.58 mg/kg  
TOTAL BTEX=<0.58 mg/kg  
TOTAL AROMATICS=<0.12 mg/kg  
16 EPA PAHs=<0.18 mg/kg  
BaP=<0.023 mg/kg

B-3: 4.0'-6.0'  
GRO=<0.54 mg/kg  
DRO=51.7 mg/kg  
TOTAL BTEX=<0.54 mg/kg  
TOTAL AROMATICS=26 mg/kg  
16 EPA PAHs=1.4 mg/kg  
BaP=<0.021 mg/kg

B-2: 8.0'-10.0'  
GRO=<0.56 mg/kg  
DRO=1.9 mg/kg  
TOTAL BTEX=<0.56 mg/kg  
TOTAL AROMATICS=1.4 mg/kg  
16 EPA PAHs=<0.18 mg/kg  
BaP=<0.022 mg/kg

B-5: 0.0'-2.0'  
GRO=<0.28 mg/kg  
DRO=2 mg/kg  
TOTAL BTEX=<0.28 mg/kg  
TOTAL AROMATICS=1.6 mg/kg  
16 EPA PAHs=<0.09 mg/kg  
BaP=<0.011 mg/kg

B-6: 2.0'-4.0'  
GRO=<0.29 mg/kg  
DRO=<0.29 mg/kg  
TOTAL BTEX=<0.29 mg/kg  
TOTAL AROMATICS=<0.06 mg/kg  
16 EPA PAHs=<0.09 mg/kg  
BaP=<0.012 mg/kg



SINCE




1881

FROEHLING & ROBERTSON, INC.

Engineering Stability Since 1881

310 Hubert Street  
Raleigh, North Carolina 27603-2302 | USA  
T 919.828.3441 | F 919.828.5751  
www.fandr.com

LEGEND

 Approximate Geoprobe Boring Location

Sample data shown in bold exceed the NCDEQ  
Action Level as outlined in the NCDEQ DWM  
UST Section Guidance

LABORATORY RESULTS & BORING LOCATION PLAN			
CLIENT: NCDOT			
PROJECT: R-2530B PSAs			
LOCATION: Albemarle, NC Parcel #140, 48130 Highway 24/27 East			
F&R PROJECT No.: 66V-0092			
DRAWN BY: T. T. Walker		CHECKED BY: B. Whitley, P.E.	
DATE: February 2018		SCALE: 1"=30'	
FIGURE No.: 3			



## **APPENDIX II**

**GEOPHYSICAL REPORT PREPARED BY PYRAMID**



PYRAMID GEOPHYSICAL SERVICES  
(PROJECT 2017-203)

# GEOPHYSICAL SURVEY

---

## METALLIC UST INVESTIGATION: PARCEL 140 NCDOT PROJECT R-2530B

48130 HIGHWAY 24/27 EAST, ALBEMARLE, NC

SEPTEMBER 8, 2017

Report prepared for:

Benjamin Whitley, P.E.  
Froehling and Robertson  
310 Hubert Street  
Raleigh, North Carolina 27603

Prepared by: \_\_\_\_\_

A handwritten signature in black ink, appearing to read "E. Cross".

Eric C. Cross, P.G.  
NC License #2181

Reviewed by: \_\_\_\_\_

A handwritten signature in black ink, appearing to read "Doug Canavella".

Douglas A. Canavella, P.G.  
NC License #1066

503 INDUSTRIAL AVENUE, GREENSBORO, NC 27406

P: 336.335.3174 F: 336.691.0648

C257: GEOLOGY

C1251: ENGINEERING

**GEOPHYSICAL INVESTIGATION REPORT**  
**Parcel 140 – 48130 Highway 24/27 East**  
**Albemarle, Stanly County, North Carolina**

## **Table of Contents**

Executive Summary .....	1
Introduction.....	2
Field Methodology.....	2
Discussion of Results.....	3
Summary and Conclusions .....	5
Limitations .....	5

## **Figures**

- Figure 1 – Parcel 140 Geophysical Survey Boundaries and Site Photographs  
Figure 2 – Parcel 140 EM61 Results Contour Map  
Figure 3 – Parcel 140 GPR Transect Location and Image  
Figure 4 – Overlay of Geophysical Survey Boundaries on NCDOT Engineering Plans

## LIST OF ACRONYMS

CADD .....	Computer Assisted Drafting and Design
DF .....	Dual Frequency
EM.....	Electromagnetic
GPR.....	Ground Penetrating Radar
GPS .....	Global Positioning System
NCDOT.....	North Carolina Department of Transportation
ROW .....	Right-of-Way
UST .....	Underground Storage Tank



## EXECUTIVE SUMMARY

---

**Project Description:** Pyramid Environmental conducted a geophysical investigation for Froehling & Robertson, Inc. (F&R) at Parcel 140, located at 48130 Highway 24/27 East, Albemarle, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project R-2530B). F&R directed Pyramid as to the geophysical survey boundaries at the project site, which were designed to extend from the existing edge of pavement to the proposed ROW lines and/or easement lines within the property, whichever distance was greater. Conducted on July 24, 2017, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

**Geophysical Results:** The property is an active service station with a known UST bed containing three known, active USTs. The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. A total of three EM anomalies were identified. The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface. GPR was performed to verify the presence of metal reinforcement in concrete adjacent to the service station building. The GPR verified reinforcement within the concrete.

Collectively, the geophysical data did not show any evidence of unknown metallic USTs at Parcel 140. Three known, active USTs were present on the west side of the property.

## INTRODUCTION

---

Pyramid Environmental conducted a geophysical investigation for Froehling and Robertson, Inc. (F&R) at Parcel 140, located at 48130 Highway 24/27 East, Albemarle, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project R-2530B). F&R directed Pyramid as to the geophysical survey boundaries at the project site, which were designed to extend from the existing edge of pavement to the proposed ROW lines and/or easement lines within the property, whichever distance was greater. Conducted on July 24, 2017, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

The site included an active service station surrounded by asphalt parking spaces. An aerial photograph showing the survey area boundaries and ground-level photographs are shown in **Figure 1**.

## FIELD METHODOLOGY

---

The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. Pyramid collected the EM data using a Geonics EM61 metal detector integrated with a Trimble AG-114 GPS antenna. The integrated GPS system allows the location of the instrument to be recorded in real-time during data collection, resulting in an EM data set that is geo-referenced and can be overlain on aerial photographs and CADD drawings. A boundary grid was established around the perimeter of the site with marks every 10 feet to maintain orientation of the instrument throughout the survey and assure complete coverage of the area.

According to the instrument specifications, the EM61 can detect a metal drum down to a maximum depth of approximately 8 feet. Smaller objects (1-foot or less in size) can be detected to a maximum depth of 4 to 5 feet. The EM61 data were digitally collected at approximately 0.8-foot intervals along north-south trending or east-west trending,

generally parallel survey lines, spaced five feet apart. The data were downloaded to a computer and reviewed in the field and office using the Geonics NAV61 and Surfer for Windows Version 14.0 software programs.

GPR data were acquired across select EM anomalies on July 24, 2017, using a Geophysical Survey Systems, Inc. (GSSI) UtilityScan DF unit equipped with a dual frequency 300/800 MHz antenna. Data were collected both in reconnaissance fashion as well as along formal transect lines across EM features. The GPR data were viewed in real-time using a vertical scan of 512 samples, at a rate of 48 scans per second. GPR data were viewed down to a maximum depth of approximately 6 feet, based on dielectric constants calculated by the DF unit in the field during the reconnaissance scans. GPR transects across specific anomalies were saved to the hard drive of the DF unit for post-processing and figure generation.

Pyramid’s classifications of USTs for the purposes of this report are based directly on the geophysical UST ratings provided by the NCDOT. These ratings are as follows:

Geophysical Surveys for Underground Storage Tanks on NCDOT Projects			
High Confidence	Intermediate Confidence	Low Confidence	No Confidence
<b>Known UST</b> Active tank - spatial location, orientation, and approximate depth determined by geophysics.	<b>Probable UST</b> Sufficient geophysical data from both magnetic and radar surveys that is characteristic of a tank. Interpretation may be supported by physical evidence such as fill/vent pipe, metal cover plate, asphalt/concrete patch, etc.	<b>Possible UST</b> Sufficient geophysical data from either magnetic or radar surveys that is characteristic of a tank. Additional data is not sufficient enough to confirm or deny the presence of a UST.	Anomaly noted but not characteristic of a UST. Should be noted in the text and may be called out in the figures at the geophysicist’s discretion.

## DISCUSSION OF RESULTS

### *Discussion of EM Results*

A contour plot of the EM61 results obtained across the survey area at the property is presented in **Figure 2**. Each EM anomaly is numbered for reference in the figure. The

following table presents the list of EM anomalies and the cause of the metallic response, if known:

**LIST OF METALLIC ANOMALIES IDENTIFIED BY EM SURVEY**

<b>Metallic Anomaly #</b>	<b>Cause of Anomaly</b>	<b>Investigated with GPR</b>
1	Three known USTs	
2	Signs	
3	Reinforced concrete	✓

EM Anomaly 1 was the result of the known UST bed containing three active USTs supplying fuel to the service station pumps. The locations of these tanks were known, and GPR was not required to delineate them. Anomaly 2 was associated with metal signs. Anomaly 3 was associated with an area suspected to contain reinforced concrete adjacent to the building. This area was investigated further with GPR.

*Discussion of GPR Results*

**Figure 3** presents the locations of the formal GPR transect performed at the property, as well as the transect image. One formal GPR transect was performed at the site. The transect was performed across Anomaly 3 where reinforced concrete was suspected. GPR verified the presence of reinforced concrete. No additional subsurface structures were observed.

Collectively, the geophysical data did not record any evidence of unknown metallic USTs at Parcel 140. Three known, active USTs were present on the west side of the property.

**Figure 4** provides an overlay of the geophysical survey area onto the NCDOT MicroStation engineering plans (proposed ROW and easements) for reference.

## SUMMARY & CONCLUSIONS

---

Pyramid's evaluation of the EM61 and GPR data collected at Parcel 140 in Albemarle, North Carolina, provides the following summary and conclusions:

- The EM61 and GPR surveys provided reliable results for the detection of metallic USTs within the accessible portions of the geophysical survey area.
- The property is an active service station with a known UST bed containing three known, active USTs.
- The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface.
- GPR was performed to verify the presence of metal reinforcement in concrete adjacent to the service station building. GPR verified reinforcement within the concrete.
- Collectively, the geophysical data did not show any evidence of unknown metallic USTs at Parcel 140. Three known, active USTs were present on the west side of the property.

## LIMITATIONS

---

Geophysical surveys have been performed and this report was prepared for F&R in accordance with generally accepted guidelines for EM61 and GPR surveys. It is generally recognized that the results of the EM61 and GPR surveys are non-unique and may not represent actual subsurface conditions. The EM61 and GPR results obtained for this project have not conclusively determined the definitive presence or absence of metallic USTs, but the evidence collected is sufficient to result in the conclusions made in this report. Additionally, it should be understood that areas containing extensive vegetation, reinforced concrete, or other restrictions to the accessibility of the geophysical instruments could not be fully investigated.



N ↑


APPROXIMATE BOUNDARIES OF GEOPHYSICAL SURVEY AREA



View of Survey Area  
(Facing Approximately Southwest)



View of Survey Area  
(Facing Approximately West)

TITLE PARCEL 140 - GEOPHYSICAL SURVEY BOUNDARIES AND SITE PHOTOGRAPHS		
PROJECT PARCEL 140 ALBEMARLE, NORTH CAROLINA NCDOT PROJECT R-2530B		
		503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology
DATE	8/24/2017	CLIENT FROEHLING & ROBERTSON
PYRAMID PROJECT #:	2017-203	FIGURE 1





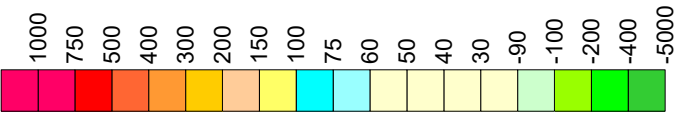
EM61 METAL DETECTION RESULTS




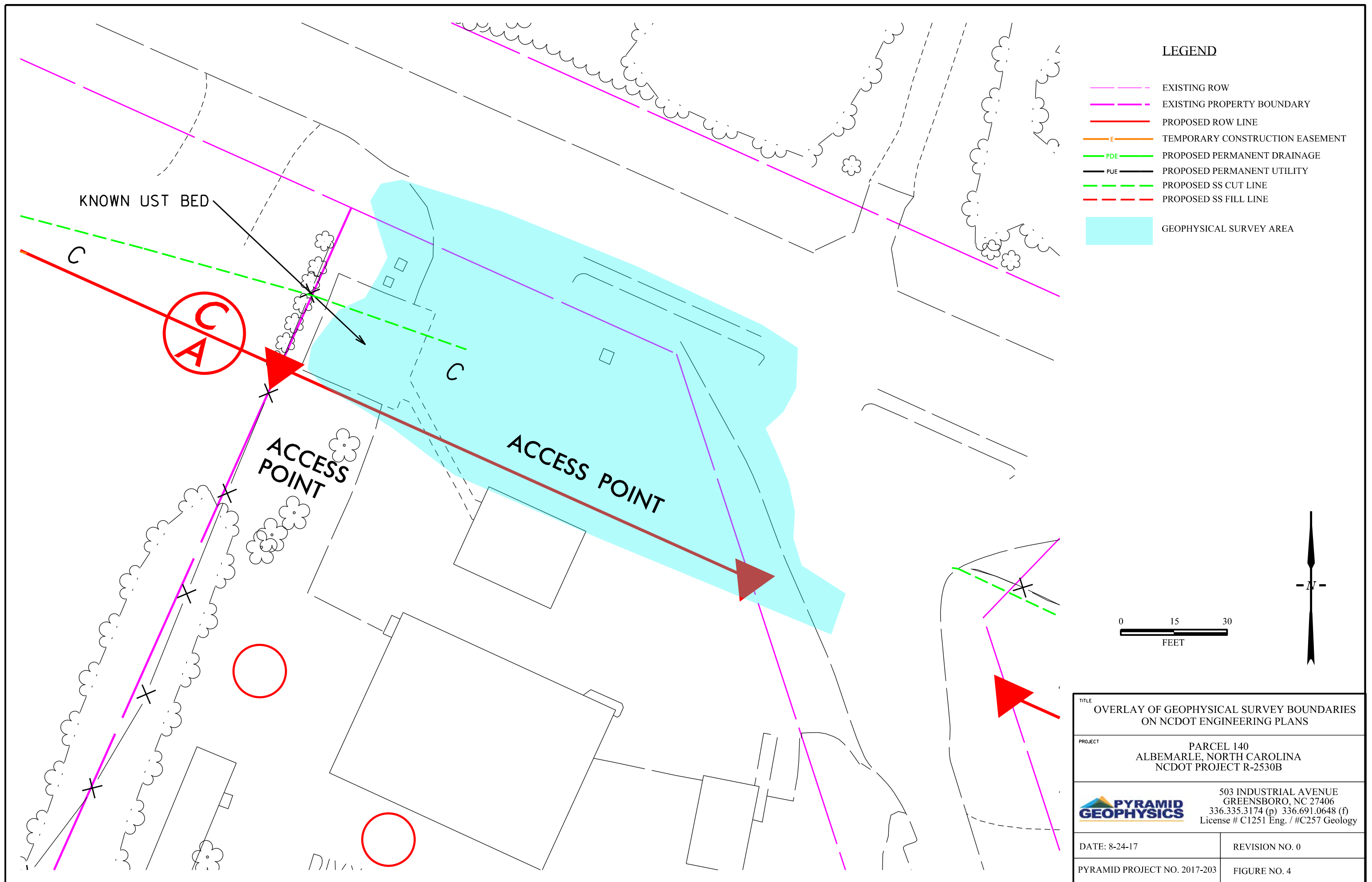
**NO EVIDENCE OF UNKNOWN  
METALLIC USTs OBSERVED.  
THREE KNOWN, ACTIVE USTs  
OBSERVED.**

The contour plot shows the differential results of the EM61 instrument in millivolts (mV). The differential results focus on larger metallic objects such as USTs and drums. The EM61 data were collected on July 24, 2017, using a Geonics EM61 instrument. Verification GPR data were collected on July 24, 2017, using a GSSI UtilityScan DF unit with a dual frequency 300/800 MHz antenna.

EM61 Metal Detection Response  
(millivolts)



TITLE		PARCEL 140 - EM61 RESULTS CONTOUR MAP	
PROJECT		PARCEL 140 ALBEMARLE, NORTH CAROLINA NCDOT PROJECT R-2530B	
		503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology	
DATE	8/24/2017	CLIENT FROEHLING & ROBERTSON	
PYRAMID PROJECT #:	2017-203	FIGURE 2	







### **APPENDIX III**

### **SITE PHOTOS**



**Photo #1:** Boring locations B-1 through B-4 and a known/active UST basin, facing northwest.



**Photo #2:** Boring locations B-5 and B-6, facing northwest.



**APPENDIX IV**

**GEOPROBE LOGS**



**FROEHLING & ROBERTSON, INC.**

# GEOPROBE LOG

Boring: P140 B-1 (1 of 1)

**Project No:** 66V-0092

**Client:** NCDOT

**Project:** R2530B PSAs

**City/State:** ALBEMARLE, NC

**Elevation:** EXISTING

**Total Depth:** 10.0'

**Boring Location:** SEE BORING LOCATION PLAN

**Drilling Method:** DIRECT PUSH

**Hammer Type:** Automatic

**Date Drilled:** 8/29/17

**Driller:** REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
	2.0	Dry, Orange, Silty Clay	2.0	6.5	One sample collected for laboratory analysis (8.0-10.0) Wethered/ old petroleum smell at eight feet
	4.0	Dry, Orange, Silty Sandy Clay	4.0	2.0	
	6.0	Dry, Brown, Silty Sandy Clay	6.0	2.2	
	8.0		8.0	21.4	
	10.0	Geoprobe Boring Terminated by Direct Push Refusal at 10 feet.	10.0	57.4	



**FROEHLING & ROBERTSON, INC.**

# GEOPROBE LOG

Boring: P140 B-2 (1 of 1)

**Project No:** 66V-0092

**Client:** NCDOT

**Project:** R2530B PSAs

**City/State:** ALBEMARLE, NC

**Elevation:** EXISTING

**Total Depth:** 11.0'

**Boring Location:** SEE BORING LOCATION PLAN

**Drilling Method:** DIRECT PUSH

**Hammer Type:** Automatic

**Date Drilled:** 8/29/17

**Driller:** REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
	2.0	Dry, Orange Brown, Silty Sandy Clay	2.0	4.0	One sample collected for laboratory analysis (8.0-10.0) No petroleum odors observed.
	4.0		4.0	3.5	
	6.0	Moist, Orange Brown, Silty Sandy Clay	6.0	4.2	
	8.0	Dry, Tan Brown, Silty Sandy Clay	8.0	7.0	
	10.0		10.0	7.0	
	11.0	Geoprobe Boring Terminated by Direct Push Refusal at 11 feet.	11.0	6.1	



FROEHLING & ROBERTSON, INC.

GEOPROBE LOG

Boring: P140 B-3 (1 of 1)

Project No: 66V-0092

Client: NCDOT

Project: R2530B PSAs

City/State: ALBEMARLE, NC

Elevation: EXISTING

Total Depth: 11.0'

Boring Location: SEE BORING LOCATION PLAN

Drilling Method: DIRECT PUSH

Hammer Type: Automatic

Date Drilled: 8/29/17

Driller: REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
		Moist, Orange Brown, Silty Sandy Clay			One sample collected for laboratory analysis (4.0-6.0) No petroleum odors observed.
	2.0	Dry, Brown, Silty Sandy Clay	2.0	3.6	
	4.0		4.0	3.3	
	6.0		6.0	4.5	
	8.0		8.0	3.1	
	10.0		10.0	2.2	
	11.0	Geoprobe Boring Terminated by Direct Push Refusal at 11 feet.	11.0	3.1	



FROEHLING & ROBERTSON, INC.

GEOPROBE LOG

Boring: P140 B-4 (1 of 1)

**Project No:** 66V-0092

**Client:** NCDOT

**Project:** R2530B PSAs

**City/State:** ALBEMARLE, NC

**Elevation:** EXISTING

**Total Depth:** 10.5'

**Boring Location:** SEE BORING LOCATION PLAN

**Drilling Method:** DIRECT PUSH

**Hammer Type:** Automatic

**Date Drilled:** 8/29/17

**Driller:** REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
		Moist, Silty Sandy Clay			One sample collected for laboratory analysis (8.0-10.5) No petroleum odors observed.
	2.0		2.0	2.2	
	4.0		4.0	2.2	
	6.0	Dry, Brown, Silty Sandy Clay	6.0	1.6	
	8.0		8.0	0.5	
	10.5	Geoprobe Boring Terminated by Direct Push Refusal at 10.5 feet.	10.5	3.3	

GEOPROBE LOG BORING LOGS - COPY.GPJ F&R.GDT 10/17/17



FROEHLING & ROBERTSON, INC.

GEOPROBE LOG

Boring: P140 B-5 (1 of 1)

Project No: 66V-0092

Client: NCDOT

Project: R2530B PSAs

City/State: ALBEMARLE, NC

Elevation: EXISTING

Total Depth: 10.0'

Boring Location: SEE BORING LOCATION PLAN

Drilling Method: DIRECT PUSH

Hammer Type: Automatic

Date Drilled: 8/29/17

Driller: REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
	2.0	Moist, Orange Brown, Silty Sandy Clay	2.0	0.3	One sample collected for laboratory analysis (0.0-2.0) No petroleum odors observed.
	4.0	Moist, Brown White Gray, Silty Sandy Clay	4.0	0.3	
	6.0		6.0	0.3	
	8.0	Dry, Brown, Silty Sandy Clay	8.0	0.3	
	10.0	Geoprobe Boring Terminated by Direct Push Refusal at 10 feet.	10.0	0.3	





FROEHLING & ROBERTSON, INC.

GEOPROBE LOG

Boring: P140 B-6 (1 of 1)

**Project No:** 66V-0092

**Client:** NCDOT

**Project:** R2530B PSAs

**City/State:** ALBEMARLE, NC

**Elevation:** EXISTING

**Total Depth:** 7.5'

**Boring Location:** SEE BORING LOCATION PLAN

**Drilling Method:** DIRECT PUSH

**Hammer Type:** Automatic

**Date Drilled:** 8/29/17

**Driller:** REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
		Moist, Brown, Silty Sandy Clay			One sample collected for laboratory analysis (2.0-4.0) No petroleum odors observed.
	2.0		2.0	0.3	
	4.0		4.0	0.5	
	6.0	Dry, Brown, Silty Sandy Clay	6.0	0.5	
	7.5	Geoprobe Boring Terminated by Direct Push Refusal at 7.5 feet.	7.5	0.5	

GEOPROBE LOG BORING LOGS - COPY.GPJ F&R.GDT 10/17/17

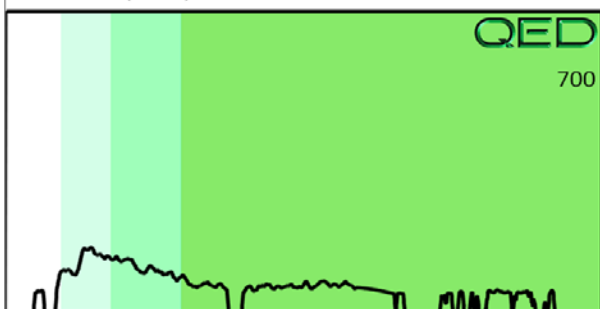


## **APPENDIX V**

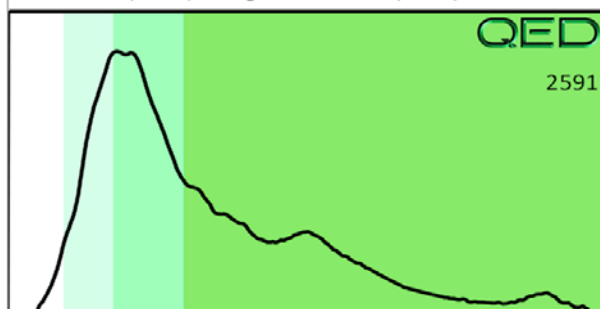
### **LABORATORY ANALYTICAL RESULTS**



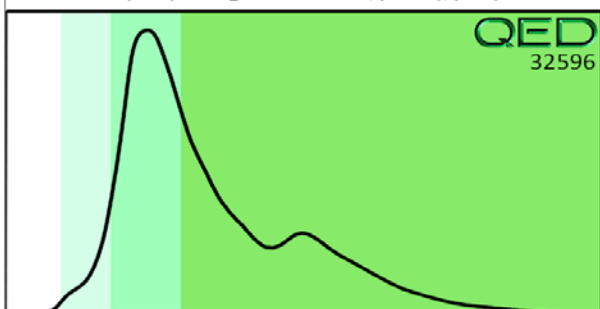
P140-B1 (8-10) : Residual HC



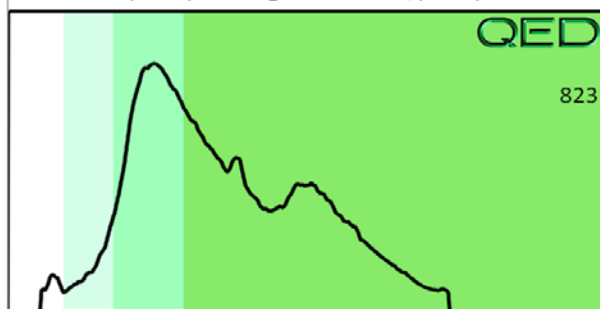
P140-B2 (8-10) : Deg Fuel 71.8%,(FCM)



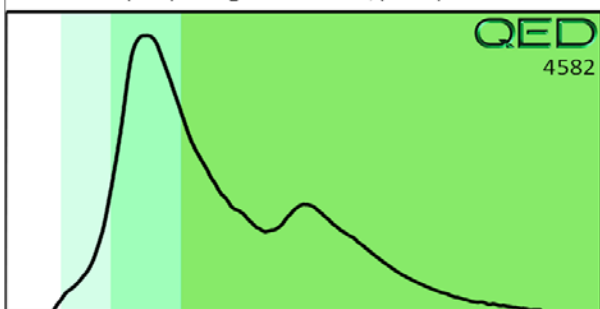
P140-B3 (4-6) : Deg Fuel 89.4%,(FCM),(BO)



P140-B4 (8-10) : V.Deg.PHC 91.6%,(FCM)



P140-B5 (0-2) : Deg Fuel 75.8%,(FCM)



P140-B6 (2-4) : ,(FCM)

